



FIG 1
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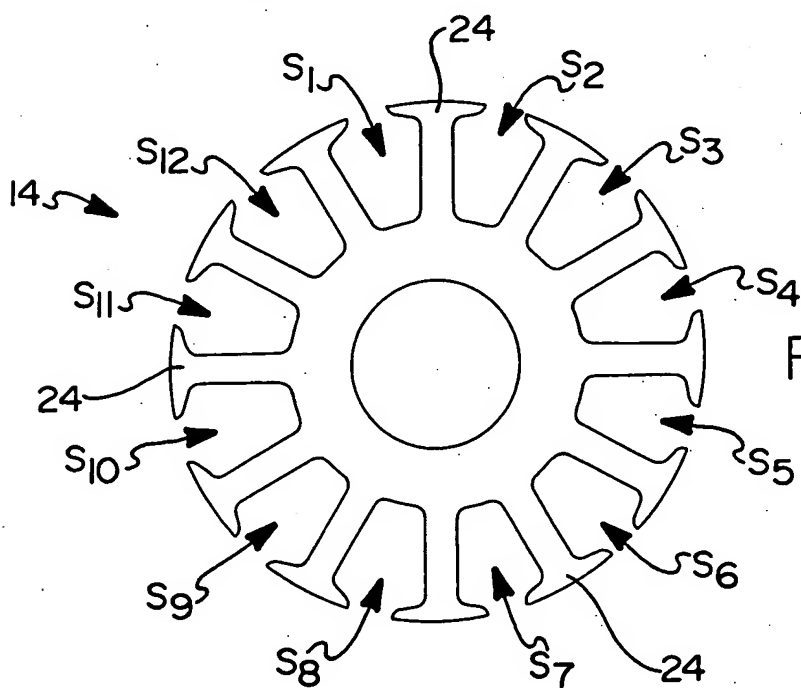
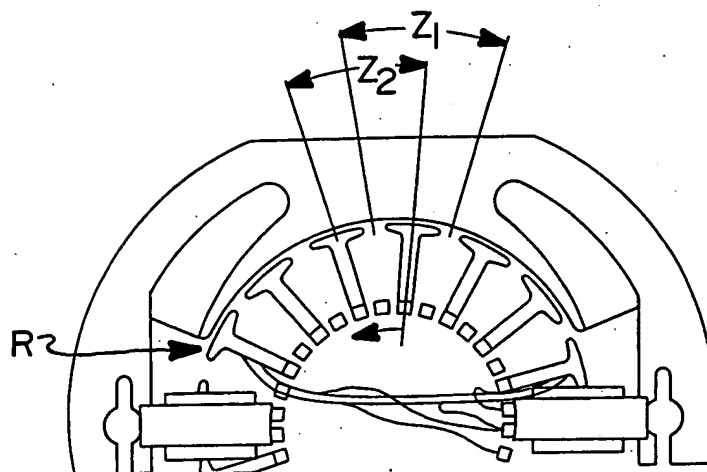


FIG 3

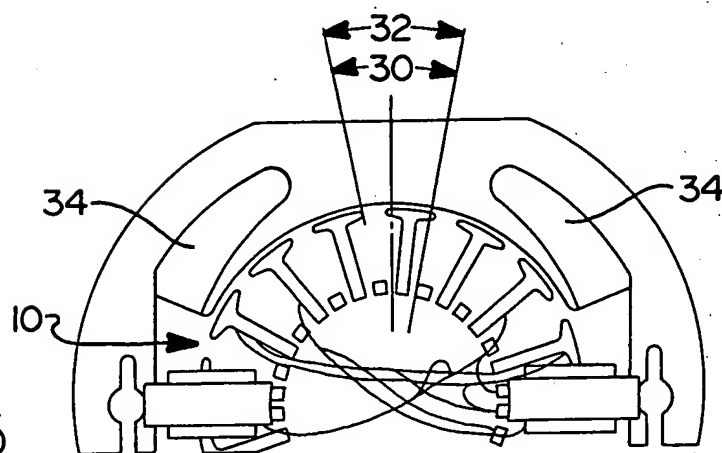


FIG 5

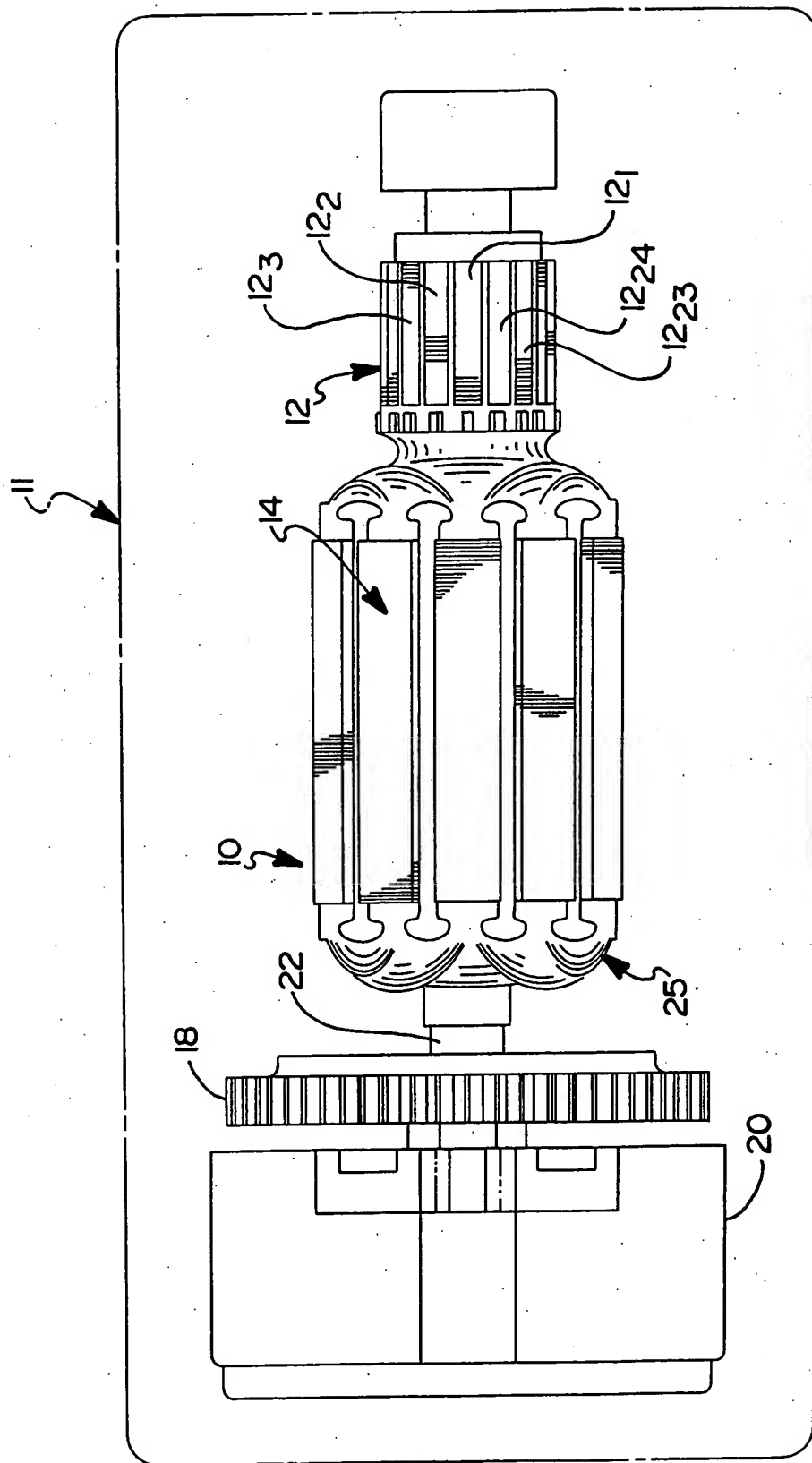
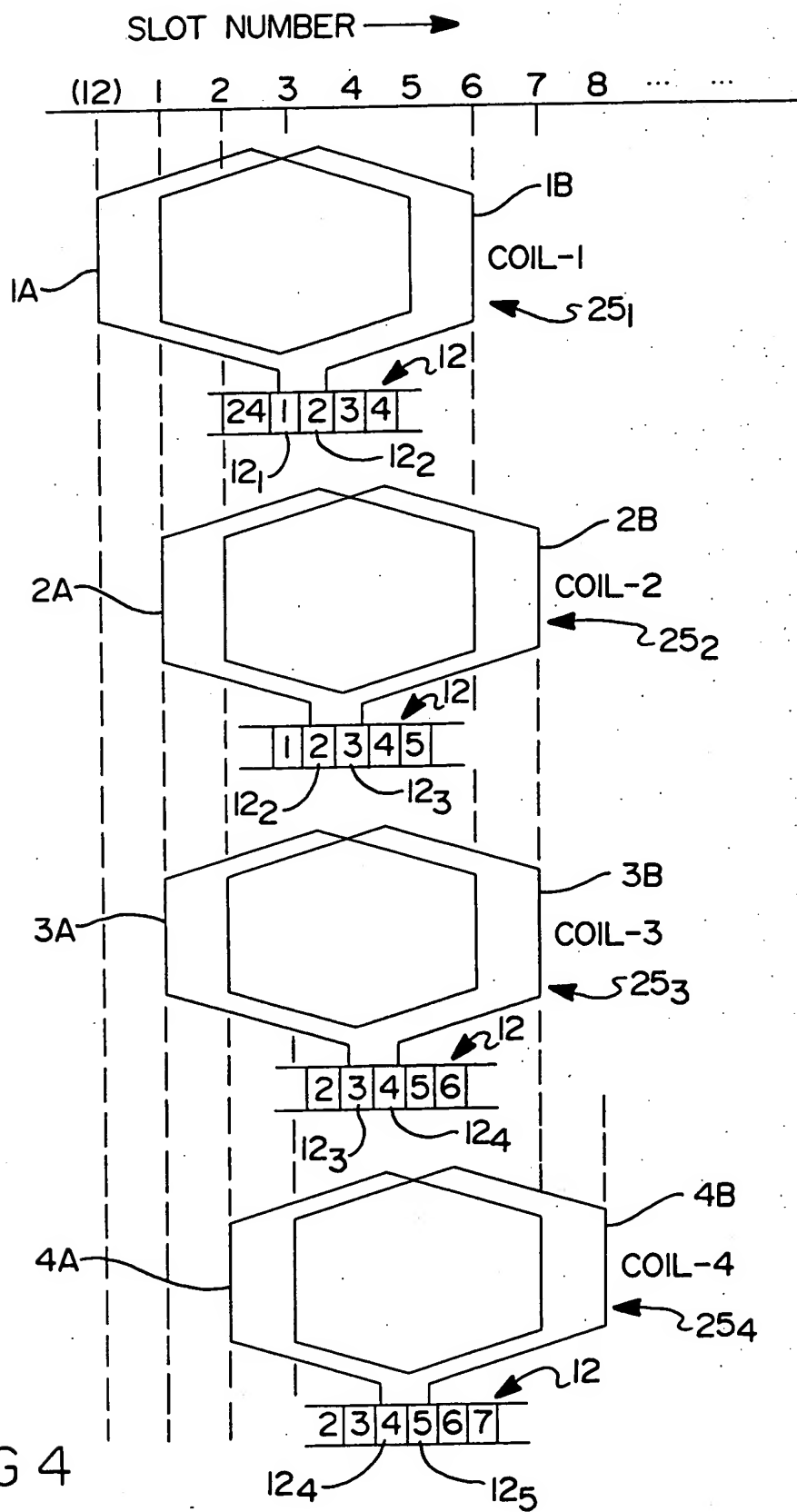
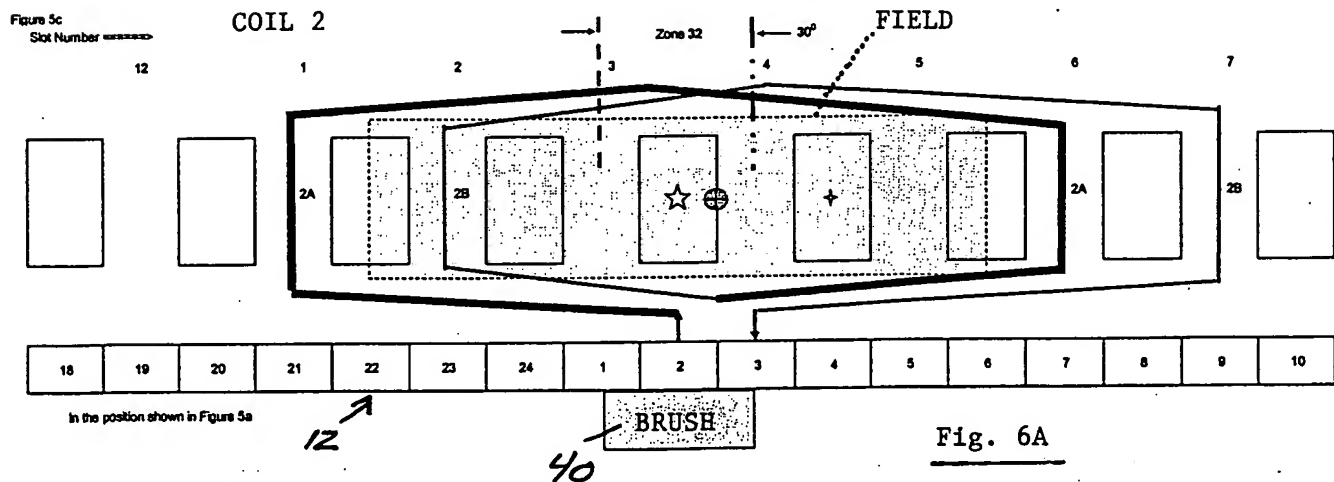
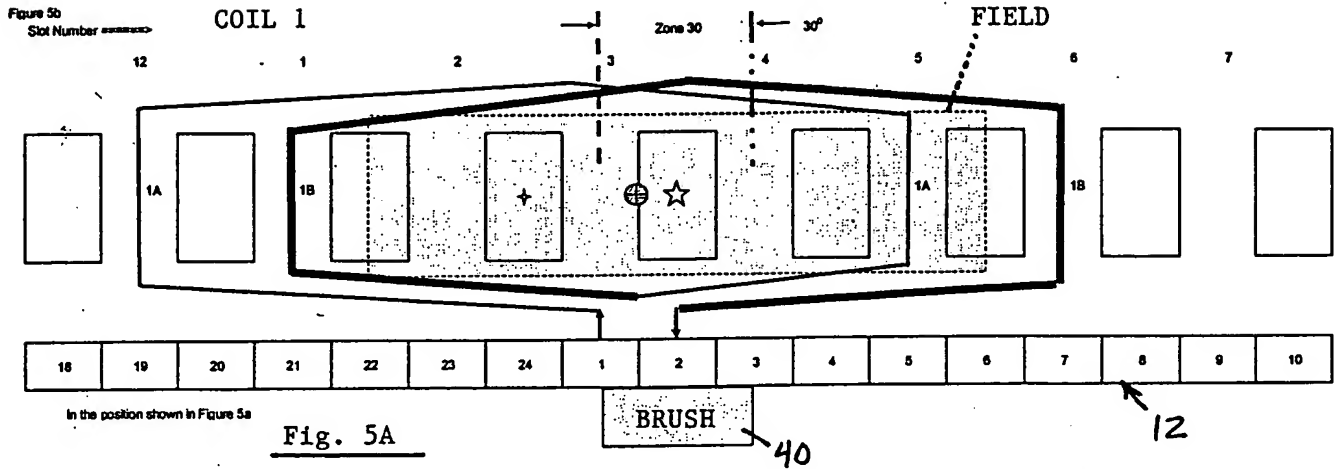


FIG 2

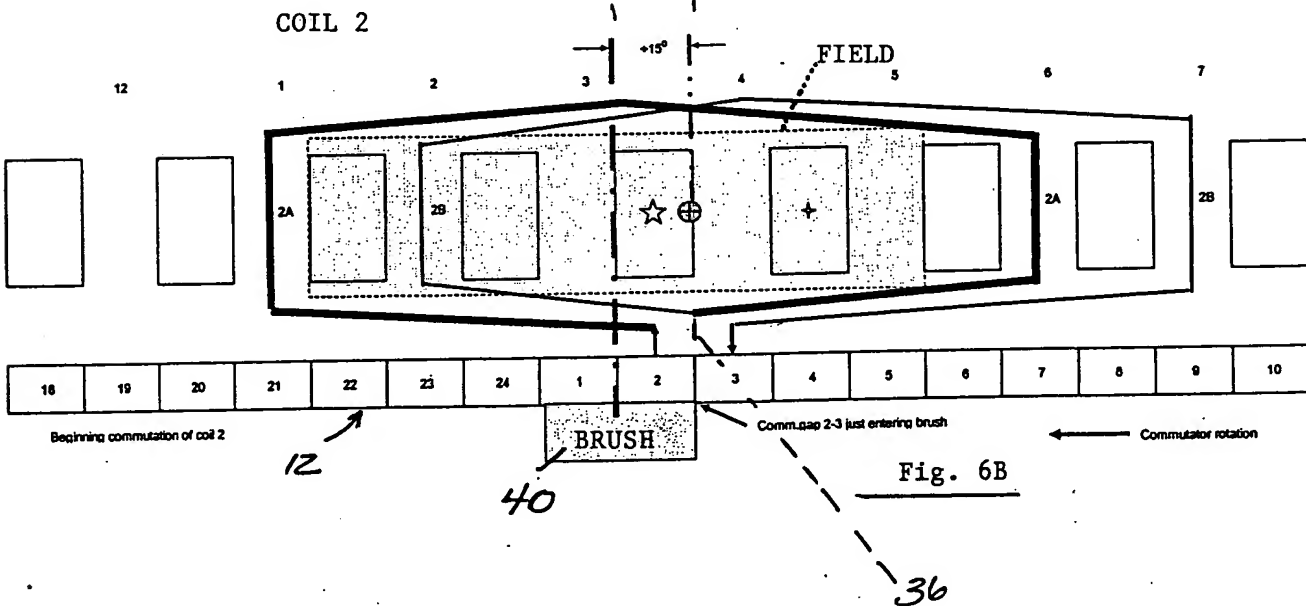
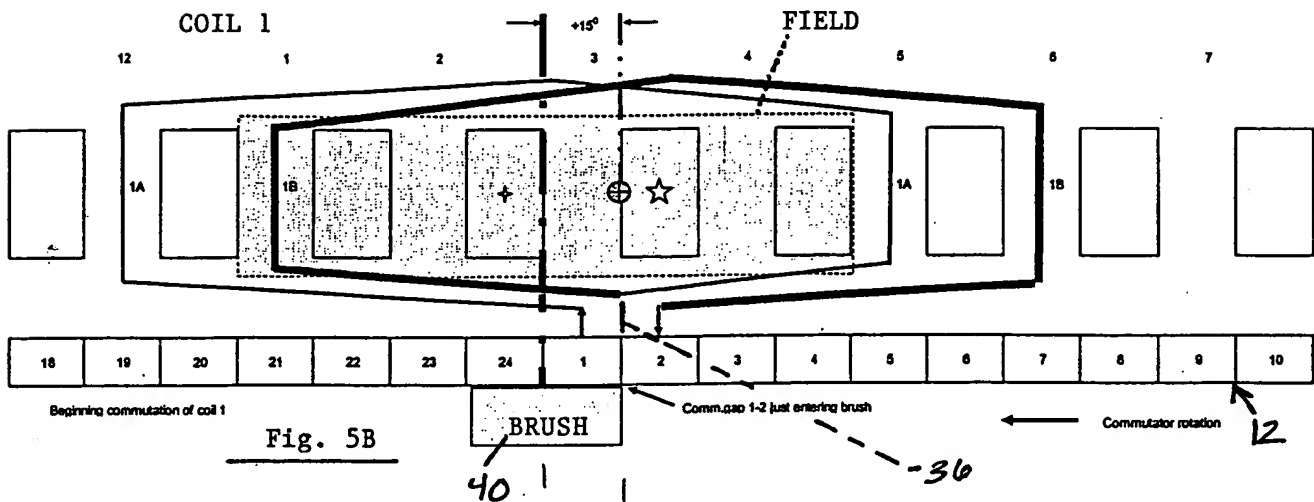


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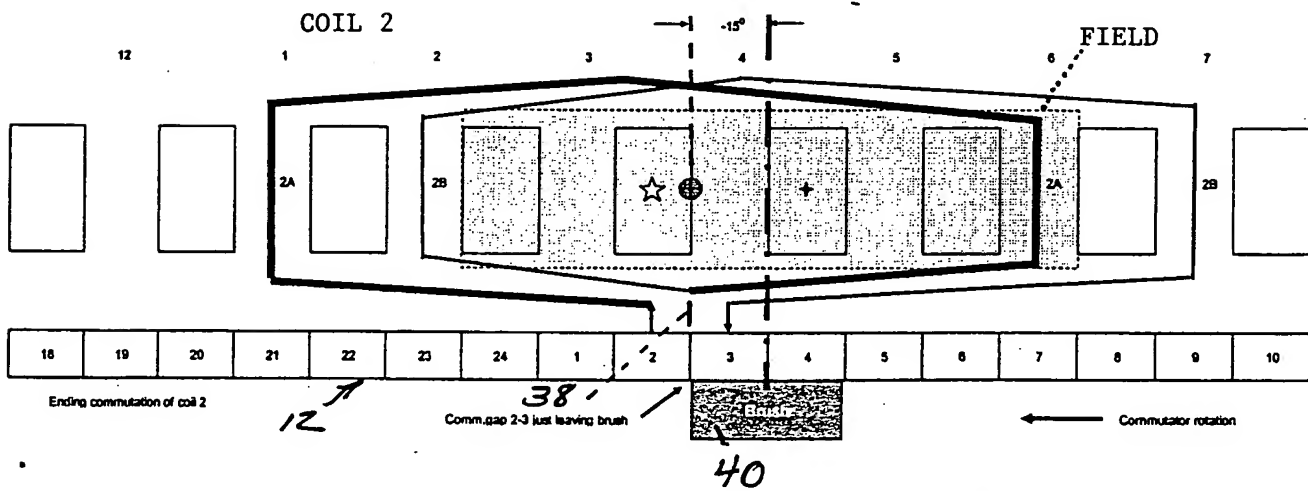
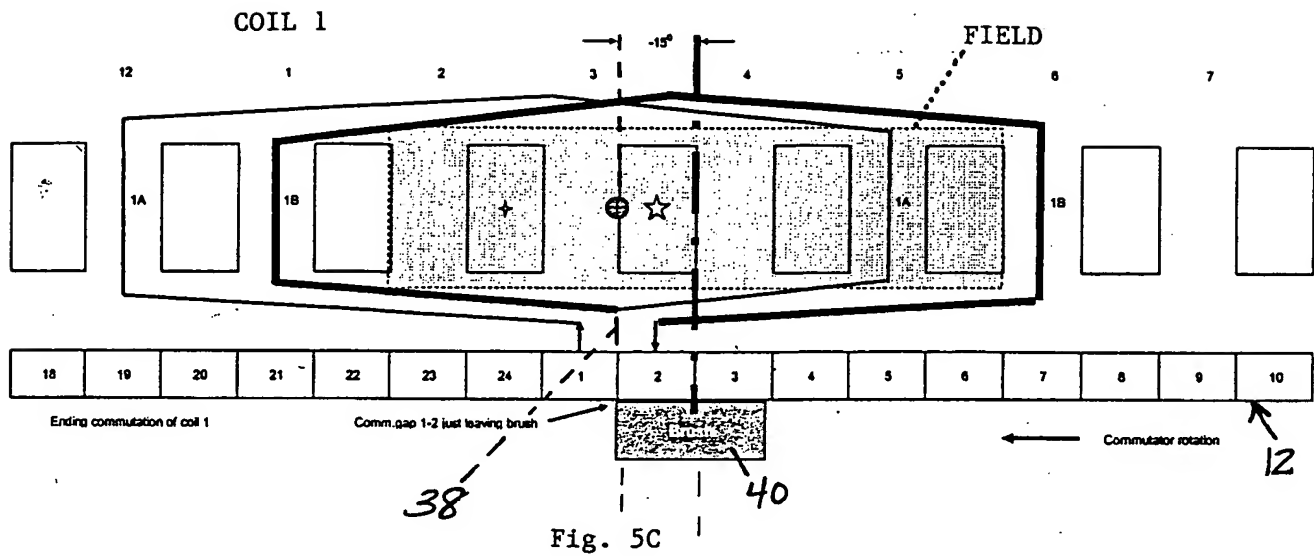
- ★ Magnetic axis of larger subcoil
+ Magnetic axis of smaller subcoil
⊕ MAGNETIC AXIS of total coil (resultant)
— Axis of field pole and brush
- - - Position of MAGNETIC AXIS at start of commutation
- - - Position of MAGNETIC AXIS at end of commutation

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- ★ Magnetic axis of larger subcoil
+ Magnetic axis of smaller subcoil
⊕ MAGNETIC AXIS of total coil (resultant)
— Axis of field pole and brush
— . . . — . . . — Position of MAGNETIC AXIS at start of commutation
- - - - - Position of MAGNETIC AXIS at end of commutation

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- KEY:
- ☆ Magnetic axis of larger subcoil
 - + Magnetic axis of smaller subcoil
 - ⊕ MAGNETIC AXIS of total coil (resultant)
 - Axis of field pole and brush
 - Position of MAGNETIC AXIS at start of commutation
 - - - - - Position of MAGNETIC AXIS at end of commutation

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| | Subcoil A slots | Subcoil B slots |
|----|--------------------|--------------------|
| 1 | $(12/5)^7$ | $(1/6)^{17}$ |
| 2 | $(1/6)^{17}$ | $(2/7)^7$ |
| | | |
| 3 | $(1/6)^7$ | $(2/7)^{17}$ |
| 4 | $(2/7)^{17}$ | $(3/8)^7$ |
| | | |
| 5 | $(2/7)^7$ | $(3/8)^{17}$ |
| 6 | $(3/8)^{17}$ | $(4/9)^7$ |
| | | |
| 7 | $(3/8)^7$ | $(4/9)^{17}$ |
| 8 | $(4/9)^{17}$ | $(5/10)^7$ |
| | | |
| 9 | $(4/9)^7$ | $(5/10)^{17}$ |
| 10 | $(5/10)^{17}$ | $(6/11)^7$ |
| | | |
| 11 | $(5/10)^7$ | $(6/11)^{17}$ |
| 12 | $(6/11)^{17}$ | $(7/12)^7$ |
| | | |
| 13 | $(6/11)^7$ | $(7/12)^{17}$ |
| 14 | $(7/12)^{17}$ | $(8/1)^7$ |
| | | |
| 15 | $(7/12)^7$ | $(8/1)^{17}$ |
| 16 | $(8/1)^{17}$ | $(9/2)^7$ |
| | | |
| 17 | $(8/1)^7$ | $(9/2)^{17}$ |
| 18 | $(9/2)^{17}$ | $(10/3)^7$ |
| | | |
| 19 | $(9/2)^7$ | $(10/3)^{17}$ |
| 20 | $(10/3)^{17}$ | $(11/4)^7$ |
| | | |
| 21 | $(10/3)^7$ | $(11/4)^{17}$ |
| 22 | $(11/4)^{17}$ | $(12/5)^7$ |
| | | |
| 23 | $(11/4)^7$ | $(12/5)^{17}$ |
| 24 | $(12/5)^{17}$ | $(1/6)^7$ |

Example: $(12/5)^7$ = 7 turns around slots 12 and 5

Figure 7

SLOTS

| | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Winding Turns | 7 _{1A} | 17 _{1B} | 7 _{2B} | 7 _{4B} | 7 _{6B} | 7 _{1A} | 17 _{1B} | 7 _{2B} | 7 _{4B} | 7 _{6B} | 7 _{8B} | 7 _{10B} |
| | 7 _{12B} | 17 _{2A} | 17 _{3B} | 17 _{5B} | 17 _{7B} | 7 _{8B} | 17 _{2A} | 17 _{3B} | 17 _{5B} | 17 _{7B} | 17 _{9B} | 17 _{11B} |
| | 17 _{13B} | 7 _{3A} | 17 _{4A} | 17 _{6A} | 17 _{8A} | 17 _{9B} | 7 _{3A} | 17 _{4A} | 17 _{6A} | 17 _{8A} | 17 _{10A} | 17 _{12A} |
| | 17 _{14A} | 7 _{14B} | 7 _{5A} | 7 _{7A} | 7 _{9A} | 17 _{10A} | 7 _{10B} | 7 _{5A} | 7 _{7A} | 7 _{9A} | 7 _{11A} | 7 _{13A} |
| | 7 _{15A} | 17 _{15B} | 7 _{16B} | 7 _{18B} | 7 _{20B} | 7 _{11A} | 17 _{11B} | 7 _{12B} | 7 _{14B} | 7 _{16B} | 7 _{18B} | 7 _{20B} |
| | 7 _{22B} | 17 _{16A} | 17 _{17B} | 17 _{19B} | 17 _{21B} | 7 _{22B} | 17 _{12A} | 17 _{13B} | 17 _{15B} | 17 _{17B} | 17 _{19B} | 17 _{21B} |
| | 17 _{23A} | 7 _{17A} | 17 _{18A} | 17 _{20A} | 17 _{22A} | 17 _{23B} | 7 _{13A} | 17 _{14A} | 17 _{16A} | 17 _{18A} | 17 _{20A} | 17 _{22A} |
| | 17 _{24A} | 7 _{24B} | 7 _{19A} | 7 _{21A} | 7 _{23A} | 17 _{24A} | 7 _{24B} | 7 _{15A} | 7 _{17A} | 7 _{19A} | 7 _{21A} | 7 _{23A} |
| Total | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 |

Examples:

- = 7_{12B} = 7 winding turns of subcoil 12B
- = 17_{2A} = 17 winding turns for subcoil 2A

Figure 8